

1. Identification

Material name	PAD ETCH 16:3:3 W/OHS, CPG GRADE
Issue date	30-June-2014
Revision date	-
Supersedes date	-
Other means of identification	
Spec ID	100000002077
Synonyms	None.
Recommended use	Etchant used in semiconductor manufacturing.
Recommended restrictions	None known.
Supplier information	
	FUJIFILM Electronic Materials U.S.A., Inc. 80 Circuit Drive North Kingstown RI 02852 Transportation Emergency: FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC: 1-800-424-9300 Medical Emergency (24HR): FOR ANY HEALTH & MEDICAL EMERGENCY, 24 HOURS /7 DAYS CALL: 1-800-365-8951 Non-emergency Telephone: FOR ALL SDS REQUESTS & QUESTIONS, CALL CUSTOMER SERVICE: 1-800-553-6546
SDS file	10382_US_EN_V1.0
Replaces file	None

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 3
	Acute toxicity, dermal	Category 3
	Acute toxicity, inhalation	Category 3
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Specific target organ toxicity, repeated exposure (oral)	Category 2 (Kidney)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
OSHA defined hazards	Not classified.	
Label elements		



Signal word	Danger
Hazard statement	Toxic if swallowed. Toxic in contact with skin. Causes skin irritation. Causes serious eye irritation. Toxic if inhaled. May cause damage to organs (Kidney) through prolonged or repeated exposure by ingestion.
Precautionary statement	
Prevention	Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing mist/vapors/spray. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.

Response	Get medical advice/attention if you feel unwell. If swallowed: Immediately call a poison center/doctor. Rinse mouth. If on skin: Wash with plenty of soap and water. Remove/Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. Call a poison center/doctor if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information
Harmful to aquatic life. Avoid release to the environment.

3. Composition/information on ingredients

Mixture

Chemical name	Common name and synonyms	CAS number	%
Ammonium fluoride		12125-01-8	25-30
Phosphoric acid		7664-38-2	10-20
Ethylene glycol		107-21-1	10-15

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation	Immediately remove from further exposure. Get immediate medical assistance. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. Give supplemental oxygen, if available. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.
Skin contact	In case of accidents: Call an ambulance immediately! Remove contaminated clothes and rinse skin thoroughly with water for at least 15 minutes.
Eye contact	Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical attention promptly if symptoms occur after washing.
Ingestion	In case of ingestion: Call an ambulance immediately! Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs. Lay on the side.
Most important symptoms/effects, acute and delayed	Inhalation: Vapors may cause drowsiness and dizziness. Eye contact: May damage eye tissue.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	None.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire-fighting equipment/instructions	Use standard firefighting procedures and consider the hazards of other involved materials. Containers close to fire should be removed or cooled with water.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Avoid any exposure. If leakage cannot be stopped, evacuate area. Wear suitable protective clothing. See Section 8 of the SDS for Personal Protective Equipment.
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Methods and materials for containment and cleaning up
Environmental precautions

Absorb spillage with suitable absorbent material. Collect in containers and seal securely. For waste disposal, see Section 13 of the SDS.
Do not allow to enter drains, sewers or watercourses unless authorized by permit.

7. Handling and storage

Precautions for safe handling

Local exhaust is recommended. Avoid any exposure. Wear approved safety goggles. Wear protective gloves and appropriate clothing to prevent skin contact. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store in closed original container in a dry place. Store above 21°C. Store away from incompatible materials.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Ammonium fluoride (CAS 12125-01-8)	PEL	2.5 mg/m ³
Phosphoric acid (CAS 7664-38-2)	PEL	1 mg/m ³

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value	Form
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m ³	Dust.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m ³	
Ethylene glycol (CAS 107-21-1)	Ceiling	100 mg/m ³	Aerosol.
Phosphoric acid (CAS 7664-38-2)	STEL	3 mg/m ³	
	TWA	1 mg/m ³	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Ammonium fluoride (CAS 12125-01-8)	TWA	2.5 mg/m ³
Phosphoric acid (CAS 7664-38-2)	STEL	3 mg/m ³
	TWA	1 mg/m ³

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Ammonium fluoride (CAS 12125-01-8)	3 mg/l	Fluoride	Urine	*
	2 mg/l	Fluoride	Urine	*

* - For sampling details, please see the source document.

Appropriate engineering controls

If enclosed handling cannot be guaranteed, ventilation and protective clothing must be used.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear approved safety goggles.

Skin protection

Hand protection

Wear protective gloves impervious to the chemicals in use.

Other

Also wear appropriate clothing to prevent any possibility of skin contact. Suitable items can be recommended by the protective equipment supplier or by a qualified industrial hygienist.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 1910.134. Use a NIOSH/MSHA approved air purifying respirator as needed to control exposure. Consult with respirator manufacturer to determine respirator selection, use, and limitations. Use positive pressure, air-supplied respirator for uncontrolled releases or when air purifying respirator limitations may be exceeded. Follow respirator protection program requirements (OSHA 1910.134 and ANSI Z88.2) for all respirator use.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance Colorless to pale yellow liquid.

Physical state Liquid.

Form Liquid.

Color Colorless to pale yellow.

Odor Mild ammonia.

Odor threshold No data available.

pH 4.6 - 7 (25°C)

Melting point/freezing point 50 °F (10 °C)

Initial boiling point and boiling range No data available.

Flash point None.

Evaporation rate < 1 (Water = 1)

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not applicable.

Flammability limit - upper (%) Not applicable.

Vapor pressure No data available.

Vapor density No data available.

Relative density 1.19 - 1.2

Solubility(ies)

Solubility (water) Completely miscible in water.

Partition coefficient (n-octanol/water) No data available.

Auto-ignition temperature None.

Decomposition temperature No data available.

Viscosity No data available.

Other information

Density 1.19 - 1.20 g/cc

Molecular weight Not applicable/mixture.

Percent volatile 30 - 55 %

10. Stability and reactivity

Chemical stability Stable under normal temperature conditions.

Possibility of hazardous reactions Will not occur.

Conditions to avoid High temperatures.

Incompatible materials Strong oxidizing agents. Strong acids. Strong bases. Cyanides. Sulfides. Metals.

Hazardous decomposition products At elevated temperatures: Hydrogen. Phosphorus oxides.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Toxic if swallowed. Causes digestive tract irritation. May cause damage to the kidneys.
Inhalation	Toxic if inhaled. May cause central nervous system effects. High concentrations: May cause respiratory tract irritation. May cause lung damage.
Skin contact	Toxic in contact with skin. Causes skin irritation. The product contains components which may penetrate skin.
Eye contact	Causes serious eye irritation.

Symptoms related to the physical, chemical and toxicological characteristics Inhalation: Vapors may cause drowsiness and dizziness. Eye contact: May damage eye tissue.

Information on toxicological effects

Acute toxicity Toxic if swallowed, in contact with skin or if inhaled.

Components	Species	Test Results
Ammonium fluoride (CAS 12125-01-8)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	2000 mg/kg
<i>Oral</i>		
LD50	Rat	1000 - 2000 mg/kg
Ethylene glycol (CAS 107-21-1)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	9530 mg/kg
<i>Oral</i>		
LD50	Rat	4700 mg/kg
Phosphoric acid (CAS 7664-38-2)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	2740 mg/kg
<i>Oral</i>		
LC50	Rat	2600 mg/kg, (Approximate)

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization No data available.

Skin sensitization Not a skin sensitizer. A few cases of sensitization have been reported.

Germ cell mutagenicity No data available.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

IARC Monographs. Overall Evaluation of Carcinogenicity

Ammonium fluoride (CAS 12125-01-8) 3 Not classifiable as to carcinogenicity to humans.

IARC: 1 = Carcinogenic to Humans; There is sufficient evidence of carcinogenicity in humans. 2A = Probably Carcinogenic to Humans; There is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals. 2B = Possibly Carcinogenic to Humans; There is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals. 3 = Not classifiable as to carcinogenicity to humans; The evidence of carcinogenicity is inadequate in humans and inadequate or limited in experimental animals. 4 = Probably not carcinogenic to humans; There is inadequate evidence of carcinogenicity in humans but evidence suggesting lack of carcinogenicity in experimental animals. Not listed = Not evaluated by IARC.

Reproductive toxicity No data available.

Specific target organ toxicity - single exposure No data available.

Specific target organ toxicity - repeated exposure May cause damage to organs (Kidney) through prolonged or repeated exposure by ingestion.

Aspiration hazard No data available.

Chronic effects Fluorides: Can cause bone damage. Prolonged overexposure to fluorides may increase fluoride content of bones and teeth, and may result in fluorosis, with mottling of teeth (in children) and brittleness of bones. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Risk of hypocalcemia with nervous problems (tetany) and cardiac arrhythmia. May cause lung damage. Ethylene glycol: Suspected carcinogen. Experimental teratogen. Human mutagenic data. Can cause cardiovascular effects.

12. Ecological information

Ecotoxicity Harmful to aquatic life.

Components		Species	Test Results
Ammonium fluoride (CAS 12125-01-8)			
Aquatic			
Algae	EC50	Algae	43 mg/l, 96 h
Crustacea	EC50	Daphnia	97 mg/l, 48 h
Fish	LC50	Fish	51 mg/l, 96 h
Ethylene glycol (CAS 107-21-1)			
Aquatic			
Fish	LC50	Fathead minnow (<i>Pimephales promelas</i>)	8050 mg/l, 96 hours
		Fish	> 100 mg/l, 96 hours
Phosphoric acid (CAS 7664-38-2)			
Aquatic			
Fish	LC50	Lepomis macrochirus	3 - 3.25 mg/l, 96 hours

Persistence and degradability No data available.

Bioaccumulative potential

Bioaccumulative potential

Octanol/water partition coefficient log Kow

Ethylene glycol (CAS 107-21-1) -1.36

Mobility in soil No data available.

Mobility in general The product is miscible with water. May spread in water systems.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Disposal recommendations are based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Hazardous waste code Not regulated.

Waste from residues / unused products Dispose of waste and residues in accordance with local authority requirements.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN1760
UN proper shipping name	Corrosive liquids, n.o.s. (Ammonium fluoride, Phosphoric acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Packing group	III
Environmental hazards	
Marine pollutant	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	IB3, T7, TP1, TP28
Packaging exceptions	154
Packaging non bulk	203
Packaging bulk	241

IATA

UN number	UN1760
UN proper shipping name	Corrosive liquid, n.o.s. (Ammonium fluoride, Phosphoric acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-

Label(s)	8
Packing group	III
Environmental hazards	No
ERG Code	8L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1760
UN proper shipping name	CORROSIVE LIQUID, N.O.S. (Ammonium fluoride, Phosphoric acid)
Transport hazard class(es)	
Class	8
Subsidiary risk	-
Label(s)	8
Packing group	III
Environmental hazards	
Marine pollutant	No.
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations This product is hazardous according to OSHA 29 CFR 1910.1200.
TSCA Section 4(a) Final Test Rules & Testing Consent Orders: Not regulated.
TSCA Section 5(e) PMN-Substance Consent Orders: Not regulated.

Drug Enforcement Administration (DEA). List 1(i), Precursor Chemicals (21 CFR 1310.02(a) and 1310.04(f)(1))
Not listed.

TSCA Section 5(a)(2) Final Significant New Use Rules (SNURs)(40CFR 721, Subpt. E)
Not regulated.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Ethylene glycol (CAS 107-21-1)

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: De minimis concentration

Ammonium fluoride (CAS 12125-01-8)	1.0 %
Ethylene glycol (CAS 107-21-1)	1.0 %

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

Ammonium fluoride (CAS 12125-01-8)	Listed.
Ethylene glycol (CAS 107-21-1)	Listed.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

Ammonium fluoride: 100
Phosphoric acid: 5000
Ethylene glycol: 5000

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - Yes Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
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Section 302 extremely hazardous substance (40 CFR 355, Appendix A)	No
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Section 311/312 (40 CFR 370)	Yes
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Drug Enforcement Administration (DEA) (21 CFR 1308.11-15) Not controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

All ingredients are TSCA compliant.

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

US. Massachusetts RTK - Substance List

Ammonium fluoride (CAS 12125-01-8)	Listed.
Ethylene glycol (CAS 107-21-1)	Listed.
Phosphoric acid (CAS 7664-38-2)	Listed.

US. New Jersey Worker and Community Right-to-Know Act

Ammonium fluoride (CAS 12125-01-8)
Ethylene glycol (CAS 107-21-1)
Phosphoric acid (CAS 7664-38-2)

US. Pennsylvania Worker and Community Right-to-Know Law

Ammonium fluoride (CAS 12125-01-8)
Ethylene glycol (CAS 107-21-1)
Phosphoric acid (CAS 7664-38-2)

US. Rhode Island RTK

Ammonium fluoride (CAS 12125-01-8)	Listed.
Ethylene glycol (CAS 107-21-1)	Listed.
Phosphoric acid (CAS 7664-38-2)	Listed.

16. Other information, including date of preparation or last revision

Further information HMIS® is a registered trade and service mark of the NPCA.
G - Safety Glasses, Gloves, Vapor Respirator

HMIS® ratings Health: 3*
Flammability: 0
Physical hazard: 0

Disclaimer THIS SAFETY DATA SHEET (SDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THE INFORMATION IN THIS SDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. FUJIFILM PLANAR SOLUTIONS BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION BUT, MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS SDS IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT FUJIFILM PLANAR SOLUTIONS AT THE PHONE NUMBER 1-800-553-6546 (CUSTOMER SERVICE) TO MAKE CERTAIN THAT THIS DOCUMENT IS CURRENT.

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